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**Science, Engineering, Mathematics and
Aerospace Academy**

Annual Performance Report
October 1, 1995 - September 30, 1996

Submitted to:

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Submitted by:

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ACKNOWLEDGMENTS

The 1996-1997 program year was one of expansion and achievement for the Science, Engineering, Mathematics and Aerospace Academy (SEMAA). The program, funded mainly by NASA Headquarters' Office of Equal Opportunity, served over 1600 students in offering science and mathematics enrichment programs.

We want to acknowledge with gratitude the SEMAA project staff and participants. The project team included Mr. Cyril Pontillo, Vice President, Business/Community/Economic Development, Mr. Cullen Johnson, Executive Director, CTED/CPE, Mr. J. Thomas McManamon, Director, SEMAA, the Program Component Coordinators for SEMAA, Ms. Patricia DeBerry, Ms. Catherine Reed, Ms. Margaret Boulding, Ms. Pam Charity, SEMAA Program Assistant, Ms. Valerie Noel-Joshua, SEMAA Administrative Assistants, Ms. Donna-Marie Morris & Ms. Kelly Prebish, SEMAA Parent Coordinator, Ms. Gail Smith, and SEMAA Hispanic Coordinator, Mr. Luis Gomez.

We especially acknowledge Dr. R. Lynn Bondurant for vision, support, input and all he has done to make the program strong and to Mr. John Hairston, for his wisdom and guidance. We also want to thank Cuyahoga Community College, NASA and other institutions', Administrators, Staff Members and Advisory Board Members for their time and the support they have provided. Without all their extensive cooperation the SEMAA project could not have succeeded in the task of assisting so many of our youth in achieving scientific and mathematics awareness.

EXECUTIVE SUMMARY

The Science, Engineering, Mathematics and Aerospace Academy (SEMAA) was established in September, 1993, by Cuyahoga Community College and the NASA Lewis Research Center. Funding for SEMAA was provided by NASA Headquarters' Office of Equal Employment Opportunities. SEMAA brought together five preexisting youth programs at Cuyahoga Community College. All the programs had shared the common goals of:

- Increasing the participation of underrepresented/underserved groups in science, mathematics and engineering and technology careers.
- Increasing "success" rates of all students interested in science and mathematics.
- Developing partnerships to recognize and support students interested in these fields.
- Supporting continued success of highly successful students.

The framework for each preexisting program allowed SEMAA to have a student population ranging from kindergarten through the twelfth-grade. This connectivness was the foundation for the many decisions which would make SEMAA a truly innovative program.

During the Third program year, 1639 students participated in the program of which 1080 were African Americans; 275 Hispanics ; 222 Caucasians and 62 Asian American and other ethnic backgrounds.

All SEMAA participants were given the opportunity for learning and developing interests through "hands-on/minds-on" experiences, field trips, speakers and mentors. All functions were developed to create an interest and a better knowledge of science, mathematics, engineering and technology by the SEMAA participants

The SEMAA components were a shared responsibility with the following institutions

participating:

INSTITUTION	GRADE LEVEL
Cuyahoga Community College	K-4
Cuyahoga Community College	5-8
Cuyahoga Community College	9-12
Case Western Reserve University	8-12
Cleveland State University	9-12
Lakeland Community College	6-8
Lorain Community College	6-8

Summer components were held at all three campuses of Cuyahoga Community College, as well as at Case Western Reserve and Cleveland State Universities. For the first time a 9th-12th grade Aerospace component was implemented at Cuyahoga Community College in 1995. An evaluation program was done by the Center for Applied Research in Education (CARE) from Cleveland State University and the database which was developed a year ago was enhanced to allow us to better track students through the various components of the program.

The Mobile Aeronautics Education Laboratory (MAEL) was completed in May of 1996 and used by SEMAA for the 9th-12th grade Summer component. The MAEL is considered a leading edge approach to teaching Math, Science and Aerospace topics. It was visited by the United States Secretary of Education in May and five members of Congress were present at the dedication along with NASA Executives from Cleveland and Washington, the President of Cuyahoga Community College, other Tri-C Executives, and various civic and School Board Leaders. The MAEL will be used for all 9th-12th grade SEMAA components in the future.

The closing event for the year was a SEMAA family picnic which was attended by nearly 700 people. It was held at the NASA Lewis picnic grounds with several NASA and Tri-C Executives attending along with U.S. Congressman Louis Stokes.

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**Science, Engineering, Mathematics and Aerospace Academy
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BACKGROUND

Establishment

The Science, Engineering, Mathematics and Aerospace Academy (SEMAA) was established in September 1993, as a joint venture by Cuyahoga Community College and the NASA Lewis Research Center. Funding for SEMAA was provided by NASA Headquarters' Office of Equal Opportunity Programs. It was intended that SEMAA was to bring together five preexisting youth science related programs at Cuyahoga Community College to serve as the foundation for expansion of the SEMAA program. Bringing together the different programs enabled Cuyahoga Community College, working with NASA Lewis, to increase the efficiency and effectiveness of these youth programs.

SEMAA was established primarily to increase the number of underrepresented and underserved students interested in science, mathematics, engineering and technology careers. However, at the same time SEMAA programs and activities are aimed at increasing the success rates of all students interested in math, science, and engineering through the different programs and activities that are offered.

SEMAA is also establishing partnerships with other science and math stake holders in programs and activities which recognize and support students interested in science and mathematics and provide for continued success of highly successful students in science, mathematics, engineering and technology education.

SEMAA Goals

The following SEMAA goals served as the framework to plan and implement SEMAA's programs and activities:

- To provide academic enrichment and career awareness programs to encourage K-12 students to acquire a strong academic background in science and math education to prepare them to pursue undergraduate programs in science, mathematics, engineering, and technology.
- To facilitate the successful transition of students from high school to postsecondary programs in science, mathematics, engineering, and technology.
- To provide parents with program activities to empower them to participate in the education of their children and to continue their education with lifelong learning.
- To introduce students and educators to "state-of-the-art" leading edge technology that can utilize experimentation and research.

As can be seen through the planned programs and activities offered through SEMAA, students can broaden their backgrounds in science, mathematics and technology and have opportunities to ensure successful transition from grade school to high school to postsecondary programs in science and mathematics. It is also very important to work with the parents to empower them to supplement and support their child(ren)'s experiences in science and mathematics. As a part of SEMAA, students get to experience "state-of-the-art-" technology, thus reinforcing what they are doing in their classroom but also augmenting their skills through new experiences.

SEMAA Philosophy of Operations

SEMAA is a set of learning experiences for K-12 grade students which will:

- enable improved participation and success in college preparatory courses in science and mathematics.
- increase interest and awareness of careers in science, mathematics, engineering and technology.
- impact involvement of parents in ensuring that their children realize the importance of science, mathematics, engineering and technology in their futures.

Accomplishing the above in a timely and economic manner requires the establishment of several partnerships working in cooperation with SEMAA. In addition, the SEMAA activities are not intended to replace science and math instruction in the schools but to provide support to schools by offering science and mathematics enrichment programs not only to complement the instructional programs but also to encourage and build upon student interest and success in science, mathematics, engineering and technology.

SEMAA provides for a seamless pipeline in science, mathematics, engineering and technology. Students participating in SEMAA are to be channeled from one SEMAA component to another. The original plan was for SEMAA to serve at least 1000 students during each program year. In addition, SEMAA uses various outside activities to foster interest in math and science. The SEMAA participants are invited to participate in the Northeast Ohio Science and Math Club which meets monthly. SEMAA has sponsored science fairs and participated in other activities with the Cleveland Public School system.

SEMAA does not work in isolation but is a part of the systemic reform in education. A completely revised SEMAA curriculum was implemented in the 1995-96 year and this curriculum complements Ohio's curriculum framework in science and mathematics. SEMAA is also designed to complement the planned Urban Systemic Initiative in Cleveland and Project Discovery. The Cleveland Public Schools have applied and have been awarded from the National Science Foundation (NSF) an Urban Systemic Initiative (USI) in Science for the Cleveland Public Schools. SEMAA has been consulted in the planning of Cleveland's USI and is a participant in the USI. Regular meetings are held and a teacher's committee from Cleveland Public Schools also advises SEMAA on curriculum. SEMAA also interfaces with Project Discovery which is an NSF funded program in the State of Ohio to provide for teacher training in science.

During its initial planning it was realized the SEMAA could not impact all of the students in the Greater Cleveland area. Therefore, target districts were identified to begin the program. The target districts include Cleveland, Cleveland Heights, Shaker Heights, East Cleveland, Warrensville Heights, and Euclid.

Various flyers were developed for the school year program and the summer program. These were distributed widely in the schools of the target districts identified earlier as well as to previous students. The students that chose to participate must have had an interest in science, mathematics, engineering and technology. For the students to participate they also had to express a willingness to attend and participate in the sessions. Expressed student interest was more important than their current academic background. Students who have an interest in science and mathematics can participate even though they have had a lower than average grade point average. Parent or Guardian involvement is required in K-8 components and it was hoped that all parents would be committed to the program. Parent involvement is not mandatory for the ninth through twelfth-grade students but is strongly encouraged. At the same time, it was hoped that the students and parents who were participating in the SEMAA program would share information about SEMAA with others. This would help in the long run to recruit other students and parents to participate. This program has worked and Parents are calling several months before the start of the program to insure that their child is able to be in the program. Many of our components now have waiting lists.

During the past year, SEMAA has expanded the duties of a coordinator whose sole duties are to further parent involvement. Parents are encouraged to participate in all the SEMAA programs and activities. Every effort is being made to support the parents in any way. Parents are often asked to provide recommendations for continuous improvement for SEMAA's programs and activities. The

parent program provides for different experiences for the parents with different age group students participating in SEMAA. For example, parents with children in kindergarten through fourth grade will be given many activities and experiences to demonstrate how they can do Family Math and Family Science with their child(ren) at home. Those parents who have students at the high school level participating in a SEMAA program will be provided opportunities and information to assist them in appropriate procedures to use in filling out college applications and financial assistance forms. The SEMAA Family picnic held in July 1996 had many parents involved in planning the picnic and many more parents volunteered to cook, serve food, clean up, run games, etc.

The Northeast Ohio Science and Math Club (NOSMC) held its first meeting in the Fall of 1995. The NOSMC served students residing in Lorain, Cuyahoga, Geauga, Lake and Ashtabula counties. The NOSMC provides continuous support and program enhancements to all of the SEMAA components so that students, when they are not actively participating in the SEMAA program directly, can participate in the NOSMC. The Club endeavors to recognize and reward student progress and accomplishments in science and mathematics. NOSMC also has activities and programs to motivate students to compete in science and math projects and to enter contests and recognition programs either as individuals or as NOSMC teams. The NOSMC also works to assist student placement in mentorships and internships in the Greater Cleveland area communities, businesses, industries, government, and post secondary institutions. The NOSMC involve many outside organizations and institutions interested in science and mathematics programs including the Great Lakes Science Museum and the Cleveland Museum of Natural History. Students participating at all levels are given career information and have career counseling. As with all the other components of SEMAA, parents are very much involved in the activities and program in many different ways. Many parents visited

NASA with their child during one of the early meetings and the parents expressed a desire to have several students/parent NOSMC meetings each year.

Administration of SEMAA has three aspects. First is Cuyahoga Community College. Cuyahoga Community College has the responsibility for project implementation and operations. The college also serves as the fiscal agent for the project and host site for the majority of programs. Cuyahoga Community College is responsible for the preparation of reports and publications related to SEMAA. The SEMAA Project Team is identified in Appendix B.

The NASA Lewis Research Center is a key player in the program. They serve as a site for many of the educational experience, such as a site for field trips, internships and projects. The Lewis staff serves as a resource for SEMAA. Lewis assists in the promotion of SEMAA and ultimately in the replication efforts. When needed, the NASA staff provides the technical expertise to the program.

The third administrative aspect is the Advisory Board which was established to provide for outside review of SEMAA's programs and activities. The Board members include representatives from Cuyahoga Community College, NASA Lewis Research Center, area colleges and universities, area school systems, the private sector, and community organizations (See Appendix C). The Advisory Board assists in identifying and linking SEMAA to other appropriate targets of opportunity in the Greater Cleveland area and provides direct advice to the Director of SEMAA. At the same time the Advisory Board is a check and balance to monitor the progress of SEMAA within the context of its purpose, expected outcomes and goals, and to make recommendations for change. The SEMAA Advisory Board meets several times a year. In addition they are invited to various events such as kickoffs the SEMAA family picnic, etc.

It is SEMAA's philosophy that program development must be done incrementally rather than doing everything at one time. For SEMAA, building one component on the previous established one is more effective and efficient than implementing everything at one time. This approach has enabled SEMAA to establish itself and get more programs started smoothly, efficiently and economically. It is much easier to add new components than make sweeping changes once a program is underway.

To increase the efficiency and effectiveness of the operations, the following have been implemented:

- 1) Combining the five original programs into one administrative design. The SEMAA administration has overall supervision of budgets, scheduling, hiring and firing, curriculum development, and coordination.
- 2) Developing one unified brochure for summer programs and one brochure for the school year within the SEMAA Office.
- 3) Unifying of the application, selection, and interest procedures. This allows for students easily transferring from one SEMAA component to the next.
- 4) Utilizing one recruitment component so that schools and agencies will find potential participants for one program rather than face a myriad of recruiters.
- 5) Establishing and implementing a database to track students from year to year and component to component.
- 6) Conducting meetings and providing training for staff to insure that all components are working together to accomplish goals.

- 7) Coordinating a SEMAA evaluation program in order to provide for continuous improvement, identify benchmarks and establish metrics.
- 8) Ensuring widespread participation in SEMAA programs by involving other organizations and universities. These include the following:
 - Cuyahoga Community College
 - Cleveland State University
 - Kent State University
 - Case Western Reserve University
 - Lorain Community College
 - Lakeland Community College
- 9) Coordinating all curriculum under one position to insure that each component builds on the previous component and that the entire curriculum supports state and federal guidelines.

Two other aspects related to SEMAA's operations include the database and evaluation.

The database has been updated to include all student information for the past year. When a student who has previously been in any SEMAA component calls to register, the students records and history are available and only update information must be entered. Reports and tracking information are available immediately as needed. Evaluation is another factor which has enabled the SEMAA program to become more efficient and effective is evaluation. Cleveland State University's Center for Applied

Research in Education (CARE) designed the evaluation plan for SEMAA. The evaluation plan provides the following;

- “Systemic Evaluation Reports,” incorporating individual SEMAA Component evaluations, tracking SEMAA’s progress in accomplishing its stated goals and objectives and identifying areas for program improvement,
- a curricular review of individual SEMAA Components establishing a baseline SEMAA curriculum, and employing a “Curricular Review Panel,” to provide a report offering SEMAA suggestions for curricular enhancement,
- reports evaluating changes in SEMAA’s students and parent component attitudes related to science and mathematics and student achievements and;
- reports on the public’s perception of SEMAA, based upon data collected from students and parents participating in SEMAA. This information was collected by a group of evaluators by phone and in person both during the program and after and the program was completed.

PROGRAM COMPONENTS

SEMAA components are as follows:

	GRADE	PROGRAM	RESPONSIBILITY
I.	K-4th	Living in Space	Cuyahoga Community College
II.	5th-8th	Exploring the Solar System	Cuyahoga Community College
III.	9th-12th	Discovering Aeronautics	Cuyahoga Community College
IV.	9th-12th	Access to Careers in Engineering	Cleveland State University
V.	8th-12th	SEMAA/Minority Engineers	Case Western Reserve University
VI.	6th-8th	Northeast Ohio Science & Math Club	Cuyahoga Community College Lakeland Community College Lorain Community College
VII.	K-12	Parents Components	Cuyahoga Community College

I. Living in Space (K-4)

Through participation in various activities involving math and science, students are introduced to the importance of teamwork in learning how the astronauts live and work in space. Classes are held at various sites in the Cleveland area as well as on Saturdays at Cuyahoga Community College.

II. Exploring the Solar System (5-8)

Students explore astronomy and tour the solar system through various activities and projects. There are multiple sessions during the school year and students are grouped by grade with each grade doing different activities. All classes are held on Saturday from 9am to 12pm.

III. Discovering Aeronautics (9-12)

Students use an aeronautics theme in various projects and activities involving science and mathematics. There are multiple sessions during the school year. All classes are held on Saturday from 9am to 12pm. The students in this program utilize the Mobile Aeronautics Education Laboratory (MAEL) which is a major part of the curriculum. Workstations in the MAEL include:

- Meteorology - students are able to determine what stars are above the horizon at the time that they visit the MAEL. The weather station provides up to the minute weather, locally and worldwide. Students can utilize this information to prepare a flight plan.
- Geographical Positioning System and Amateur Radio Station - here students can communicate worldwide to gather data related to aeronautics. The GPS system enables students to locate their position on Earth within 10 meters.
- Wind-tunnel - through activities conducted in the wind tunnel, the students gain insights into the use of a wind tunnel to solve aeronautical problems.
- Aeronautics Interactive - at this workstation students are able to determine major aeronautical contributions from the various aeronautics centers. This information was used to solve problems. A multitexted format is utilized so that students can branch through the program.
- World Wide Web - Utilizing the INTERNET, students research topics related to aeronautics.
- Aircraft Design station - utilizing the aeronautics program developed at NASA AMES the students construct various aircraft and test their efficiencies.
- Geographical Information System - at this work station students do remote sensing of information collected by aircraft. Students study how areas have changed; determine scales; and do other similar type activities.
- Aeronautics Educational Materials - this station permits participants to review current and past NASA aeronautical educational materials.

A stage area 12 feet by 20 feet (3.75 meters by 6.4) is located by one of the entrances to the trailer. This stage can be used as a platform for group presentations and demonstrations.

IV. Access to careers in Engineering (ACE) focuses on programs to introduce participants to engineering careers. The ninth through twelfth-grade students who participate are given academic enrichment in science, mathematics and engineering. The program meets two days per week, two hours each session and there is a six week summer component which meets 20 hours per week.

V. SEMAA/Minority Engineers Industrial Opportunity Program (MEIOP) also serves ninth through twelfth-grade students. The purpose of MEIOP is to improve, challenge and enrich students' skills in mathematics and science. MEIOP is also to prepare student for college entrance exams such as the PSAT or the ACT and at the same time to further increase student knowledge about engineering and science. Parents are made aware of the need and opportunities available in engineering, technology and science careers. Participants meet every Saturday for three hours during the academic year from October to April. The summer component meets in June and July.

ACCOMPLISHMENTS DURING THIRD PROGRAM YEAR

I. Grades K-4

The SEMAA K-4 component serves as entry level into the SEMAA pipeline. Crucial to the success of children in math and science is the encouragement that parents give to youngsters. Therefore, the K-4 component is based upon family learning and involvement. Families attend SEMAA classes together in an informal setting and engage in enjoyable math, science, and aerospace activities in a game-based format. Families commit to a series of sessions which meet for one to two hours after school or on Saturday mornings. The curriculum emphasis for K-4 is "Living in Space". This curriculum was developed in conjunction with a NASA consultant. It was compared with the

goals and objectives of the Ohio Model Science Curriculum and the National Science Standards to insure that the activities supported the current systematic reform initiatives and are age appropriate.

During the 1995-96 School year, the component offered classes starting at various times at multiple locations throughout the city from January to May. In this way the program could accommodate family schedules and allow the families to attend as a unit. The Summer cycle was for students only and consisted of a five class session that was held for third graders entering the fourth grade in September, 1996. Students attending the summer cycle were recruited from the Winter and Spring cycles as well as being student new to SEMAA. There was also had a special ten session summer program at the El Barrio community Center which serves the Hispanic community. This program consisted of the regular programs supplemented by additional math & science modules and taught by Bilingual teachers.

The program is working and appears to be accomplishing the goals of the original SEMAA proposal. This can be seen from the following:

- Consistent and increasing attendance rates at classes. Attendance rate have increased each year.
- Retention of SEMAA families for a three year period. Over 50% of families return.
- Increased number of student who report participation on science fairs.
- Informal data from parents that indicates many students request to be taken to the library to pursue questions raised in SEMAA classes.
- Requests by parents for information on science resource materials and toys on a more frequent basis.
- Number of student who indicate they attend area science museums on a more frequent basis.
- Informal rating scales where student indicate on a scale of 1 to 5 that SEMAA is a 10.
- Increased number of students who call the office for information about SEMAA classes.
- The number of schools that have requested SEMAA classes.
- Results of pre and post tests.

The 1995-1996 program offered a total of 12 separate four week sessions. Each session met for approximately one hour except for sessions which were held on Saturday mornings which met for two hours each. A total of 361 students participated in the sessions held at local school sites in the Greater Cleveland area and at the Eastern and Metro campuses of Cuyahoga Community College. An

additional 53 Hispanic students attended class sessions at El Barrio Community Center, located on the west side of Cleveland.

During the Summer of 1996, a total of 49 students in grades three and four attended 5 class sessions at Metro and Eastern campuses of Cuyahoga Community College. Hispanic students from the El Barrio Community Center participated in a two week summer program for students in grades K-6. This program served a total of 172 students. The students who came to the El Barrio Community Center attend over 18 different schools in the Cleveland Public Schools. The greatest concentration of students came from Kentucky Elementary School and Marian Seltzer Elementary School. Many of the children at El Barrio are just learning English as a Second Language. For many of these children, only Spanish is spoken at home as their parents have only recently immigrated from Puerto Rico or Mexico.

Over 90% of the students attended all of the Academic Year sessions. The attendance rate for the Summer program was approximately 97%. Students participated in a pre and post test that was referenced to the curriculum, "Exploring the Universe and the Physics of Light". The students showed an aggregate increase of 113% improvement between tests. It is important to note that many of the goals and objectives of the K-4 component cannot be measured by traditional means. There still is no effective way to convey in a written report or with a test score the joy and excitement students experience when they see the results of an experiment that they have planned and followed to fruition.

Throughout the year, many informal evaluations were made of the success of the program. Informal ratings scales were used where students evaluated each of the activities. Because of the age of the students in the program, simple rating forms such as a happy face or a face with a frown were utilized. Parents were asked to complete comment cards after each class session in which they evaluated the class. The constant comment was that the program was "awesome" and needed to be extended and expanded in time and topics.

When asked how many students had library card or used the library, the majority of SEMAA students indicated that they had a card and went to the library at least once a month.

As the program continues to evolve, more sophisticated methods of evaluation will be needed. From the informal data collected by the K-4 component, it appears that the program is highly effective and enjoyable for both student and family members.

Table 1a

<i>GENDER BREAKDOWN BY GRADE LEVEL</i>			
<i>GRADE LEVEL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>TOTAL</i>
KINDERGARTEN	34	19	53
FIRST GRADERS	90	52	142
SECOND GRADERS	39	46	85
THIRD GRADERS	78	53	131
FOURTH GRADERS	94	88	182
OLDER (EL BARRIO STUDENTS)	23	21	44
TOTAL	357	279	637

* At the El Barrio Hispanic Center some older students participated in the summer program.

Table 1b

<i>ETHNICITY BREAKDOWN FOR K-4</i>			
<i>AFRICAN AMERICAN</i>	<i>HISPANIC</i>	<i>WHITE</i>	<i>OTHER</i>
277	229	106	25

II. Grade 5-8

For the 1995-96 academic school year, separate programs were offered for fifth, sixth, seventh, eighth grade. All used the discovering the solar system theme. The program was offered in two session (winter & spring), each lasting eight weeks. There was also a summer program. The Metropolitan Campus of Cuyahoga Community College was utilized on Saturday mornings for all of the program's activities. A total of 197 students participated in the academic year program and an additional 226 students in the summer program. All participants completed both a pre- and post-test.

The program has been very successful in providing access to a large number of the underrepresented and underserved students in the Greater Cleveland area and in meeting all of the initial goals and anticipated outcomes for the year. The determination of success in meeting anticipated outcomes is measured by the following goals: 1) at least 90% of the participants will show an improvements in science and mathematics learning as measured by pre- and post-test results; and 2) at least 90% of the participants will show knowledge and interest in science, mathematics, and technological careers based on survey data.

The results of the pre- and post-test for the academic and career information for science and mathematics indicate that 100% of the students showed significant improvement in test scores. The aggregate improvement between pre- and post-test in the academic year was 37% and in the summer program 50%. Both qualitative and quantitative data collected from interviews and surveys with project director, staff, students, and parents indicated a high level of parental support for involvement in the educational process.

There were several major highlights of the academic year: 1) results from student evaluation data was excellent, 2) the average attendance during the academic year was 77% 3) students from the 7th and 8th grade as well as student from the 9th thru 12th grade component had a chance to test the Mobile Aeronautics Education Lab (MAEL) and 4) the culminating activities and recognition program held the final week of each session at NASA Lewis Research Center were effective and well received by both students and parents. Presentations were made by students at each grade level and then tours of various NASA facilities were made available. Over 340 students and parents attended the activities.

It should be noted that the attendance figures are for a program which is held on Saturday where no stipends are paid, no bus tickets are given, and no lunch is provided . Results from the student evaluation data, based on student pre- and post-test scores, and the percent of improvement for each session indicated that all of the students participating in the program improved over the eight-week period. The average pre-test scored for the year 56% and the average post-test score was 76%.

The Summer program was similar to the academic year program in having excellent results from evaluation data and excellent attendance. Results of the evaluation data based on pre- and post- test scores showed the average improvement was 50%. The average attendance of 93% showed the students were interested in the program. It should be noted that all students were admitted to the program on a first come, first serve basis and there was no other selection criteria.

Statistics:

Table 2a

<i>GENDER BREAKDOWN BY GRADE LEVEL</i>			
<i>GRADE LEVEL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>TOTAL</i>
FIFTH GRADERS	61	69	130
SIXTH GRADERS	63	61	124
SEVENTH GRADERS	47	58	105
EIGHTH GRADERS	26	38	64
TOTAL	197	226	423

Table 2b

<i>ETHNICITY BREAKDOWN FOR 5-8</i>			
<i>AFRICAN AMERICAN</i>	<i>HISPANIC</i>	<i>WHITE</i>	<i>OTHER</i>
346	17	34	26

19% fewer students were served than last year because of not having a fall program. However, the percent of African American students increased from 73% to 87%. The percent of Hispanic students decreased from 8.8% to 4%. This is because this program was more focused on our main target areas on the east side of Cleveland. Because we started K-4 program this year in a predominately Hispanic area, we expect major increases in the number of Hispanic students in the future in the 5-8 grade program as the students move up into this component.

III. Grade 9-12

For the first time a program was offered for grades 9-12 at Cuyahoga Community College. The theme was discovering aeronautics. Classes were offered in with week sessions eight the first seven weeks at Cuyahoga Community College and the final week at NASA Lewis Research Center. The students in the program averaged 76% attendance and averaged at 29% improvement from pre- to post-test. It is interesting to note that there was a higher percent of males than females in this component. We had been averaging 55% females the past two years and we now appear to be receiving considerable interest from high school males as well as females.

Feedback from the students and parents was excellent and many of the students were involved with testing the MAEL. Most of the students from grades 9-11 have expressed an interest in returning to SEMAA for the 96-97 year especially because the program will utilize the MAEL even more than it did last year. The summer program was broken into two different groups. The first group used the MAEL for the entire program and the second group had limited use of the MAEL and a longer emphasis on careers in Aeronautics. The two groups were necessary because we could only have a limited number of student utilizing the MAEL and we had a large number of students who registered for the program.

Table 3a

<i>GENDER BREAKDOWN BY GRADE LEVEL</i>			
<i>GRADE LEVEL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>TOTAL</i>
NINTH THRU TWELFTH	53	46	99

Table 3b

<i>ETHNICITY BREAKDOWN FOR 9-12</i>			
<i>AFRICAN AMERICAN</i>	<i>HISPANIC</i>	<i>WHITE</i>	<i>OTHER</i>
80	6	10	3

Access to Careers in Engineering (ACE) for 9-12 grades

The Access to Careers in Engineering (ACE) program at Cleveland State University annually recruits ninth through twelfth grade students who are interested in pursuing careers in engineering, science, math or technology related areas. ACE provides academic enrichment in Math and English, as well as lessons concerning various engineering principals and career opportunities. The pursuit of these activities, including the National Engineers' Week and Shadow-an-Engineer Day, enables students to meet and learn from professional engineers, engineering students and members of the CSU faculty and administration.

In 1995-96 there were fifty-eight (58) students who participated in the ACE program. There were eleven (11) seniors in the class. Nine (9) have confirmed plans to attend college, two (2) of whom have applied to Cleveland State University in pursuit of engineering careers. The remaining two (2) students joined the Navy and the Coast Guard and plan to attend college upon completion of their

military service. A first year scholarship will be provided to those students who enroll at Cleveland State.

On May 10 and 11, 1996 a team of six ACE program students won Third Prize in the Lunar Roving Robot contest, sponsored by the Ohio Aerospace Institute at Wright Patterson Air Force Base in Dayton, Ohio. The team also won First Place for the design of a simulated lunar terrain. Prior to the event, students took a tour of the Air Force Museum.

Two ACE students served internships with Cleveland State's Chemical Engineering Department from June-August, 1996, sponsored by the American Chemical Society, earning \$1,500 each. The two internships, supervised by CSU chemical engineering professors, focused on the following area of study:

- 1) Diffusion Measurements through a Single Zeolite Crystal, and
- 2) Optimal Conditions for Vapor Phase Lubrication using FMC Phosphate Esters

A third ACE student was employed in a paid, full-time position at CSU's Advanced Manufacturing Center working with staff and undergraduate students on a variety of research projects.

The ACE Summer Academic Enrichment Program was in session from June 17 to July 26, 1996.

Thirty-one (31) students participated in the program. which provided skill enhancement in English, Algebra I, Geometry, Trigonometry and Pre-Calculus. Students learned how to write a research paper and then applied that knowledge by preparing a three to five page report about a topic related to an engineering field of interest to the student.

Guest speakers were a key element of both the summer and the academic year sessions. Presenters included CSU Careers Services staff, representatives of the KINK program for minority undergraduate students, A physics instructor from Shaker Heights High School also engaged students in interactive lessons.

Students also viewed the videos “Race Against Time,” “The Challenge of Manufacturing,” “Excellence in the Making,” and “Defying Gravity.” During the final week of the summer program ACE students also received a tour of Cleveland’s new Great Lakes Science Center and viewed the film “Destiny in Space.” Activities, speakers and videos were followed by short quizzes, games or discussions to test students’ retention of information.

Table 4a

<i>GENDER BREAKDOWN BY GRADE LEVEL</i>			
<i>GRADE LEVEL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>TOTAL</i>
NINTH GRADERS	11	6	17
TENTH GRADERS	8	8	16
ELEVENTH GRADERS	9	4	13
TWELFTH GRADERS	6	6	12
TOTAL	34	24	58

Table 4b

<i>ETHNICITY BREAKDOWN FOR 9-12 (CSU)</i>			
<i>AFRICAN AMERICAN</i>	<i>HISPANIC</i>	<i>WHITE</i>	<i>ASIAN</i>
48 (83%)	1	8 (14%)	1

NORTHEAST OHIO SCIENCE & MATH CLUB (NEOSM)

The Northeast Ohio Science & Math Club ((NEOSM) held its inaugural meeting in November at Lakeland Community College with a program on Amateur Radio. The program was hosted by an engineer who holds several patents and who is a radio operator along with an 11 year and a 16 year old HAM radio operator. NASA also participated with representatives from the Amateur Radio Club. The program consisted of demonstrations, discussion of radio waves, careers utilizing amateur radio, and hands-on experiences. The same program with the same facilitators were held the same month at Cuyahoga Community College and at Lorain Community College. Between the three locations 201 students attended and many parents ended up staying for the program.

In December the club met at NASA for a tour of the zero gravity building and the Visitor's Center along with another demonstration of Amateur Radio in the Visitor's Center. Meetings were sporadic because of funding and the NASA furloughs, but the meetings that were held were well attended. Over 300 students and families came to the Natural History Museum where a talk on Astronomy and visit to the observatory were part of the program.

The NEOSM also participated in the MAEL dedication and the SEMAA family picnic in July.

SEMAA/Minority Engineers Industrial Opportunity Program (MEIOP) for 9-12 Grades

Case Western Reserve University (CWRU) has maintained programs designed to increase the number of minority students obtaining degrees in engineering. The minority groups which have been identified

as being underrepresented in engineering progressions-- American Indian, African American and Hispanic-- are actively recruited for participation in these programs. Currently there are three phases to their programs in which SEMAA is involved: 1) the Case Pro Engineering Program (Case PEP)-- a five week summer program for students who are entering the eighth and ninth grades: 2) the Case Early Exposure to Engineering for Minority Students (CEMS)-- a five week summer program for students entering the tenth and eleventh grades and; 3) the Pre-College Phase of the Minority; Engineering Industrial Opportunity Program (MEIOP)-- a five week summer program and Saturday morning sessions during the academic year for students in the twelfth grade.

The SEMAA/CWRU program for eighth through twelfth-grade students was held in the summer of 1996. The students took classes in mathematics and science and participated in hands-on projects related to mathematics and science concepts.

Statistics - SEMAA/Minority Engineers Industrial Opportunity Program Component:

Table 5a

GENDER BREAKDOWN BY GRADE LEVEL			
GRADE LEVEL	MALE	FEMALE	TOTAL
EIGHTH GRADERS	15	31	46
NINTH GRADERS	21	30	51
TENTH GRADERS	13	14	27
ELEVENTH GRADERS	11	19	30
TWELFTH GRADERS	7	9	16
TOTAL	67	103	170

Table 5b

ETHNICITY BREAKDOWN FOR 9-12 (CWRU)			
AFRICAN AMERICAN	HISPANIC	WHITE	ASIAN
161	4	1	4

One hundred seventy students participated in MEIOP activities. The students came mainly from Cleveland Public Schools and other systems with large minority population. Table 5a and Table 5b show the breakdown of year one's participants by grade, gender and race. Note that there are several more females than males. While we would like to keep the genders approximately equal, we found as in previous years as males get older it was difficult to get them to stay in the program if they were in sports because of practice requirements.

Summer Youth Program:

All units of SEMAA again had a summer youth program. All three campuses of Cuyahoga Community College were utilized as was NASA Lewis Research Center and the El Barrio Center. The ACE Program also had their summer program at Cleveland State, and MEIOP Program, their summer program at Case Western Reserve University.

Though each program had separate performance objectives as approved and expected from the funding source. They all required academic enrichment and career exploration as important components.

Over 500 students were involved in regularly scheduled math/science enrichment activities, hands-on experimentation, field trips, career discovery events, weekly Academic Challenge quizzes, computer literacy experiences and sessions that explained the African American and Hispanic cultures. Career information was available through computer programs. The groups came together to hear presentations from outside speakers. Pre- and post-tests indicated that definite improvement was shown in students' knowledge at every level of the program. This is especially significant because of the increased use of state wide proficiency tests.

Program Highlights:

- Twenty students from the program were selected for a one-day trip to Washington, D.C. The selection process was accomplished through attendance, references, effort in the program, and teacher recommendation. During the trip the students met with Congressman Louis Stokes, visited NASA Headquarters, visited the Challenger Center and participated in the challenger program, and visited the Lincoln Memorial and the Washington monument.
- The Mobile Aeronautics Education Lab (MAEL) was utilized for the first time. Two one week programs were held with the newly developed curriculum. The MAEL was tested during the academic year but it was not used until the summer program for an entire program.
- The El Barrio Hispanic Center was utilized for the first time for a complete program. Over 160 students participated.
- The first annual SEMAA family summer picnic was held at NASA Lewis Research Center. This was the culminating activity for the yearly program. Congressman Louis Stokes, several NASA officials, and several Cuyahoga Community College officials were present as were almost 700 students and their families.

New Approach to Self Achievement

The New Approach to Self Achievement (N.A.S.A.) ran for five weeks from July 1 to July 31 at the Metropolitan Campus of Cuyahoga Community College. The program's chief goal was to create an atmosphere in which students could increase their interest and knowledge of science and math which, in turn, would increase the likelihood of their entering technical careers. The program was not

intended to duplicate a regular classroom, but to be an adventure in discovery, and an exciting summer experience.

Fifty three students were recruited from the Cleveland area middle schools. Each student completed an application form and wrote an essay outlining reasons for wanting to participate in the program, such as career goals and hobbies. A parental permission form, a letter of recommendation from a teacher, and a parent-student interview with the director were also required.

Classes were held from 1pm to 5pm on Monday through Thursday, and a workshop was held on Saturday mornings. The sessions combined lectures, homework, and skills building with hands-on activities. Presentations were given by minority engineers and scientists, and field trips occurred during scheduled time. At the beginning of each day, all students came together as group and were given overall instructions for the day's activities.

As in past years, the students were divided into three groups: a) Bridges, with students from the 6th and 7th grades, b) Electronics, with students from the 7th grade, and; c) Airplanes, with seventeen student from the 8th grade.

The Bridges group assignment was to simulate a construction company, and to design a bridge. In addition to studying a number of technical concepts, the project required that the student ask economic questions.

The Electronic group worked with a kit to gain a better understanding of related scientific and mathematical concepts. Students learned about voltage, inductance and power. The also had a brief introduction to Calculus.

The Airplane project involved the construction of model airplanes and a study of flight-related theories and terminology's. The project enabled the students to study physic concepts, gravity, biology (how do birds fly), and mathematics.

Each Thursday the students in the three groups came together to participate in an "Academic Challenge" activity. This activity was enjoyed by the students and had much to do with an improvement from the pre-test to the post-test. Awards were given to the winners of the Academic Challenge competition.

The staff for the program consisted of a program coordinator, an assistant and three project specialists. Each specialist had student leaders to assist them.

Evaluation from staff and students showed an over-all satisfaction with the program components. Students learned how to work within a time structure, how to follow rules and guidelines, and displayed a willingness to revise and/or modify actions when necessary.

Program Highlights:

- Most of the students had 100% attendance for the entire program.
- The Academic Challenge portion of the program was enjoyed by the students.
- A closing ceremony for staff, students, parents and funders was held at NASA.
- Field trips to the Great Lakes Science Center, Cleveland Hopkins Airport, and the Goodtime III Cuyahoga River Tour were educational and informative..

Statistics - New Approach to Self Achievement

Table 6a

<i>GENDER BREAKDOWN BY GRADE LEVEL N.A.S.A.</i>			
<i>GRADE LEVEL</i>	<i>MALE</i>	<i>FEMALE</i>	<i>TOTAL</i>
SEVENTH GRADERS	8	11	19
EIGHTH GRADERS	8	9	17
NINTH GRADERS	7	10	17
TOTAL	23	30	53

Table 6b

<i>ETHNICITY BREAKDOWN FOR N.A.S.A.</i>			
<i>AFRICAN AMERICAN</i>	<i>HISPANIC</i>	<i>CAUCASIAN</i>	<i>OTHER</i>
48	0	2	3

Tables 6a and 6b show that females outnumber males, and that 91% of the students are African American. 4% are Caucasian, and 5% are other.

ADVISORY BOARD

The Advisory Board formally met twice to review progress and to offer suggestions and assistance. There were also several informal meetings between the Director and various Advisory Board members. Representative of organizations such as local Science Museums and the El Barrio Hispanic Center were invited to join the board and provide input as to how we can work closer together to provide even better education for the SEMAA students and potential SEMAA students. SEMAA is now reaching a maturity stage with the enhanced curriculum implemented, the MAEL functioning, the Science & Math Club in operating, and the Parents component becoming very active. Each component was presented to the board and assistance in further developing each component was solicited. We hope to involve each member of this board in a continuing role as an active advisor to at least on component so that we can take advantage of their expertise to enhance the program even more.

Progress During the Third Year of SEMAA

We set several goals which we wanted to accomplish during the third year of SEMAA. These goals were detailed in our 94-95 annual performance report. The goals and accomplishments are:

- | | | |
|----|--------|--|
| 1. | Goal | Implement the new Aerospace oriented curriculum starting with the academic year of 1995. |
| | Result | This was accomplished at all grade levels. |

2. Goal Ensure that the Science & Math club is fully operative.
Result The Science & Math club started in November and meetings were held at Lakeland Community College, Lorain Community College, Cuyahoga Community College, and NASA Lewis Research Center. We held meetings sporadically instead of monthly because of the NASA furloughs and uncertainty of funding.
3. Goal Start the 9-12 Aeronautics curriculum at Cuyahoga Community College.
Result This was done for both the academic year program and the summer program.
4. Goal Continue developing a strong parent and family component.
Result This was done and parent & families were much more involved in all components.
5. Goal Recruit more Native Americans and Hispanic students.
Result This was very successful with Hispanic students with the implementation of our program at the El Barrio Hispanic Center. Work still must be done to recruit more Native Americans.
6. Goal Retain a higher percent of high school age male students.
Result We are making some progress. The MAEL is attracting a very high percent of male 9-12 students.
7. Goal Start a mentoring program in conjunction with the Science and Math Club.
Result We made some minor progress toward this goal but full implementation is planned for 95-96.
8. Goal Train the staff in the utilization of the new Aerospace curriculum.
Result All staff was trained and the program implemented.
9. Goal Implement "career awareness" sessions in conjunction with the Science & Math Club.
Result This was done but it will become more effective in 95-96 as meetings are held monthly.

- | | | |
|-----|--------|---|
| 10. | Goal | Structure the evaluation flow to provide continuous feedback to ensure the program meets the objectives. |
| | Result | Several evaluators talked to the students and parents and provided feedback to the SEMAA Director. However the enhanced parent component was just as important because of continuous meetings and feedback. |
| 11. | Goal | Have all curriculum, training manuals, components, and measurements in place by the end of the academic year in order to replicate the program in other locations. |
| | Result | The majority of this is done. We need a professional writer to finalize the training manual. Funds for the writer are in the replication proposal. |
| 12. | Goal | Continue to develop the marketing plan which was started with the summer 95 session. |
| | Result | This is complete. |
| 13. | Goal | Expand the data base system now in place to include the math and science progress in school. This will be measured by tracking grades and proficiency test results. |
| | Result | The data base system is now capable of holding the required information but we have not yet been able to get the information from the multiple school districts we serve. |
| 14. | Goal | Begin utilizing the Mobile Aeronautics Education Laboratory (MAEL). |
| | Result | This is complete. |
| 15. | Goal | Begin discussion to replicate SEMAA as least at one community college. |
| | Result | This is done. A proposal has been written to replicate SEMAA. NASA has put the money into the 1996-97 budget for replication. |

RECRUITMENT

Much time and planning was expended in recruiting more Hispanic and Native Americans in the program. Some success was realized by offering the program for younger children in predominantly Hispanic communities. For the first time both the academic year program and the summer program were offered at the El Barrio Hispanic Center. The Director of the Hispanic Center has been added to our Advisory Board and we plan to continue offering programs at the center.

However, more must be done with the Native Americans. This will again be a major focus in 1996-97. The brochures and past participants have placed the program in the enviable position of have a substantial number of participants registering several months before the programs start. A concentrated effort is continuing to be made to become known in our target areas and use the past participants to actively promote the programs. This has been a very good year for publicity and the program is much better known than it was a year ago. Several SEMAA students met with U.S. Secretary of Education Riley and others were present at the MAEL Dedication along with Five U.S. Congressman. These events received good television coverage. It increased the number of calls to our office and it will have an effect on enrollment. There is also an active core of principals who are very effective in getting their students to participate in the program.

ANALYSIS

The SEMAA program enrolled over 1600 students in the school year and summer activities See Table 7). All the students were involved in activities which taught and encouraged enthusiasm for science, mathematics aeronautics and engineering. The 1995-96 program consisted of five teaching

components, a parents organization, The North East Ohio Science & Math Club, and summer enhancements. (See Figure 1).

Each component concentrated on a specific age group and developed its own curriculum as appropriate to its age group. In many cases a component had a separate grade level. The curriculum was redesigned this year to allow for natural progression and to ensure maximum learning opportunities for the participants.

The overall goal of SEMAA was to begin a process which would connect the programs, the parents, the curriculum, the students and the staff; i.e. to give a total experience to students as they proceed from kindergarten to elementary school to high school graduation. This differs radically from the piecemeal events, highlights and peripheral happenings which characterize so many of today's programs. This individuality of components is represented in the variety of arrangements for students. At present, the K-4 component takes place mainly in suburban schools plus two campuses of Cuyahoga Community College and The El Barrio Hispanic Center while the 5-8 programs concentrate their recruitment in the Cleveland Public Schools. The 9-12 programs draw from the entire area. Note that there was an increase in suburban school district participants. This was caused mainly by the increase in participants in the K-4 program which was offered in the suburbs and by offering additional programs at CCC Eastern and Western campuses, both of which are in the suburbs.

The gender distribution (See Figure 3) shifted this year to more males than females. The past two year was the reverse. Much of this can be attributed to the additional programs at the El Barrio Hispanic Center which has substantially more males than females and in the utilization of the MAEL which attracted high school age males.

SEMAA is targeted to serve underserved/underrepresented youth. During the past year significant gains were made in serving the Hispanic population. We targeted the younger Hispanic population by offering the K-4 component in the El Barrio Hispanic Center. We received excellent reviews from both the students and the parents at the center. We will be tracking this closely to see if the Hispanic students continue in the program as they move into higher grades and have to go to Cuyahoga Community College for the program. We have received substantial interest from last years 4th grade students and parents. But it remains to be seen what the actual attendance will be.

Goals for 1996-97

1. Have Monthly science & math club meetings.
2. Replicate SEMAA in at least two locations.
3. Serve at least 1700 students.
4. Continue developing a strong parent component and ensure that the parents are more involved in each component.
5. Continue the program at the El Barrio Hispanic Center and develop at least one more outreach location.
6. Further expand the MAEL involvement and expose all 9-12 grade students to it.
7. Expand the Math and Science Club to include grade 9.
8. Develop at least one additional component which will compliment the current components.
9. Further expand career awareness for all middle and high school students.

10. Improve the database to include better tracking students in math and science and in the proficiency exams.
11. Complete the operations manual.

FINANCIAL INFORMATION

SEMAA's budget for the year was \$500,000. As has been cited earlier, the funding was provided by the Office of Equal Opportunity Programs at NASA Headquarters. The funds were transferred to the Lewis Research Center which then funded SEMAA through Cooperative Agreement No. NCC3-323.

The major expenditure of funds were for programmatic aspects:

K-4 Component, Living in Space, CCC	\$70,000
5-8 Component, Exploring the Solar System, CCC	70,405
9-12 Component, Discovering Aeronautics, CCC	59,775
9-12 MEIOP, Case Western University	80,000
9-12 ACE, Cleveland State University	5,000
6-10 New Approach to Self Achievement	17,000

Other expenditures were:

Evaluation Consultants	18,000
Database design and programming	18,000
Recruitment	15,000
Northeast Ohio Science and Math Club	16,439
Administrative Costs	71,826
Supplies	21,479
Subtotal	462,960
Indirect Costs (8%)	<u>37,040</u>
Total	500,000

CONCLUSION

SEMAA has come a long way in less than three years. Over 1600 K-12 students were served by the various SEMAA components. As can be seen from the breakdown the students served (figure 4 pg. 36), were African Americans, Hispanics, Caucasian Americans, Asians, and Native American.

The program success to date is primarily due to the partnership that has been established between Cuyahoga Community College and the NASA Lewis Research Center, the coordination with Case Western Reserve University, Lakeland Community College, Lorain County Community College, Cleveland State, and the devotion and commitment of the SEMAA staff.

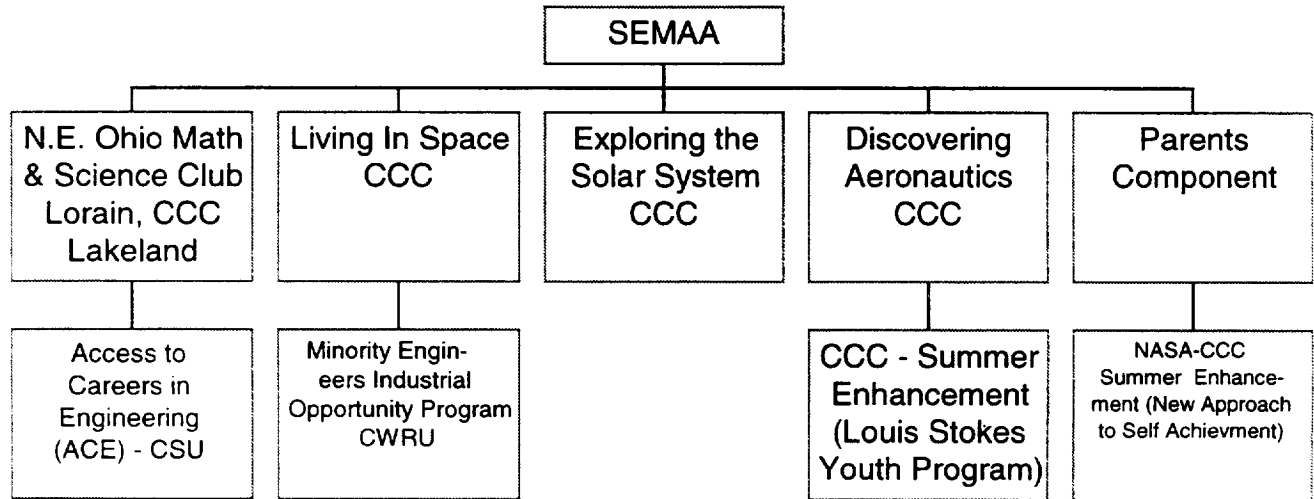
A very supportive Advisory Board has been established. We have added representatives from the area museums and the Director of a large Hispanic organization. The members are helping us not only promote SEMAA but develop programs utilizing area museums and facilities. SEMAA has already been recognized for its accomplishments to date by being selected the most innovative program in higher education for Ohio 1994, by the Ohio Higher Education Continuing Education Association. The visit by United States Secretary of Education, Richard Riley and the several Congressmen who met with the students shows the positive image the program has achieved.

Plans are in place for the fourth year of operation. It is anticipated that by the end of the fourth year of operation SEMAA will be relocated in at least two locations with the following components:

- K-4th Living in Space program, 5th-8th Exploring the Solar System program, and 9th-12th Discovering Aeronautics programs.
- Evaluation program to assess programs in relationship to established goals and criteria.
- Database to provide for tracking of students and administration of program.
- Parent program to complement each of the components.
- Information on establishing regional science/math clubs wherever program is implemented.
- Promotional materials which can be adapted at local levels for recruitment of students.

While all components can be replicated, the order of replication and the speed of replication will depend on the local funding available.

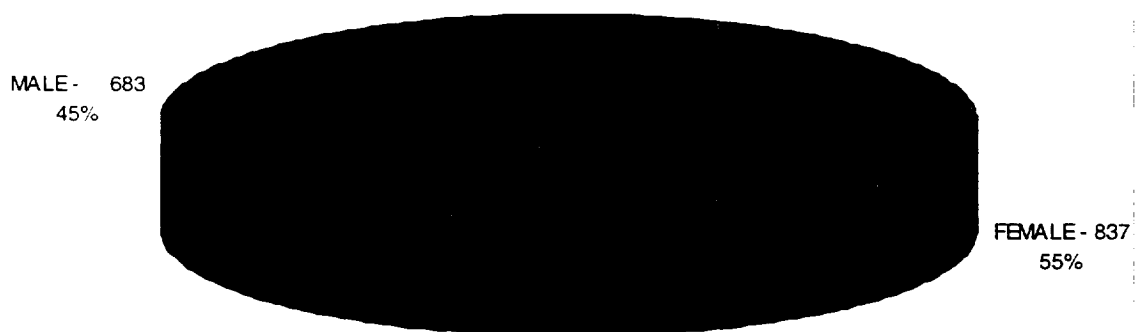
Component Chart



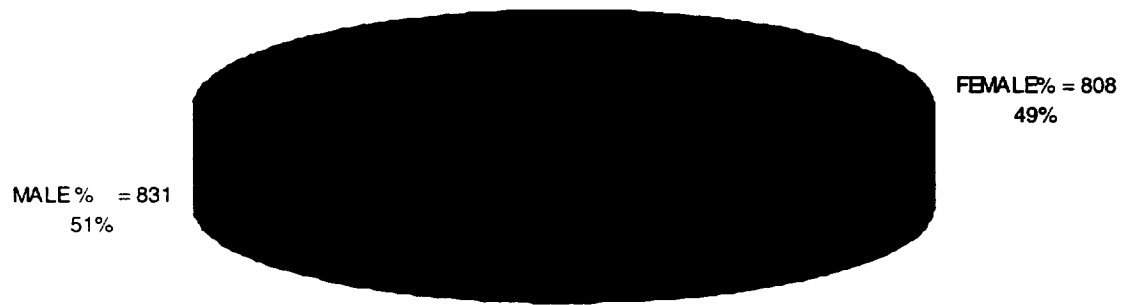
Distribution by Gender - 1993 - 1994



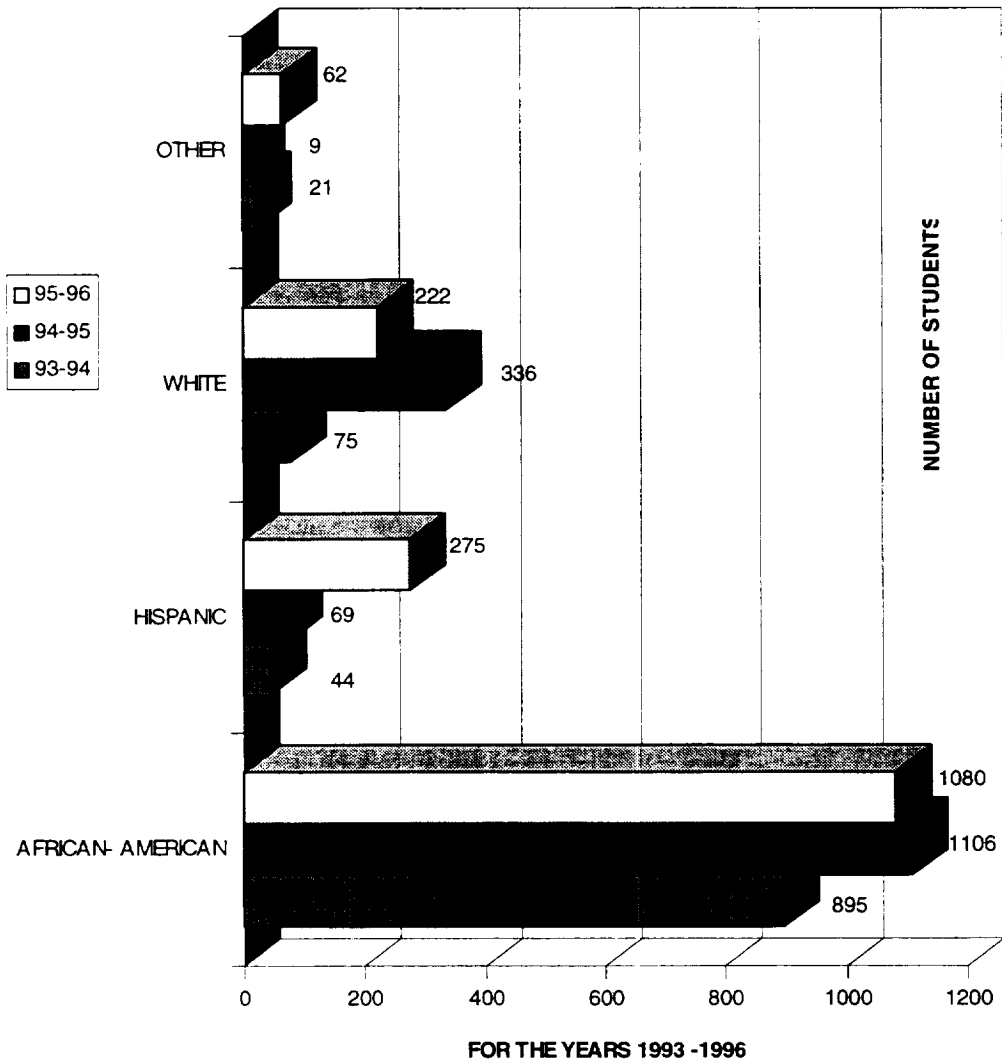
Distribution by Gender - 1994 - 1995



GENDER DISTRIBUTION 1995 - 1996



DISTRIBUTION BY ETHNIC BACKGROUND



APPENDIX A

SEMAA FLYERS



**CUYAHOGA COMMUNITY COLLEGE,
THE SCIENCE, ENGINEERING,
MATHEMATICS, & AEROSPACE ACADEMY
(SEMAA) AND NASA LEWIS RESEARCH
CENTER**



INVITES:

**ALL STUDENTS GRADES KINDERGARTEN
THROUGH HIGH SCHOOL**

**TO BE A PART OF THE
1996 SEMAA PROGRAMS**

Sign up now for the 1996 SEMAA programs. Some classes for grades kindergarten through fourth are held during the week, other classes for kindergarten through fourth are held on Saturdays at Eastern Campus 10am to 11:30am. Fifth through twelfth grades are also on Saturdays at Metro Campus 9am to 12:00pm. Some programs are eight weeks long and all are FREE OF COST.

**WE CAN ONLY ACCEPT A LIMITED
NUMBER OF STUDENTS AND WE WILL FILL THESE
PROGRAMS QUICKLY!**

The grade levels are:

The programs are:

The sites are:

Kindergarten - Grade 4

Living in Space

Various Schools

Kindergarten - Grade 4

Living in Space

Eastern Campus

Grades 5 - 8

Exploring the Solar System

Metro Campus

Grades 9 - 12

Discovering Aeronautics

Metro Campus

This is a hands-on program where students will learn by doing exciting & interesting experiments. The program will be held at CUYAHOGA COMMUNITY COLLEGE METROPOLITAN AND EASTERN CAMPUS.

Registration by mail only, no phone registration will be accepted!

Complete & Return the Attached Forms.

If you have questions or concerns, call 987-4420.

Thank you for your cooperation!



Cuyahoga Community College
Center for Training and Economic Development
Division of Educational Opportunities

2415 Woodland Avenue
Cleveland, Ohio 44115 3196
216/987-3092 FAX 216/987-3038

SEMAA

Science, Engineering,
Mathematics and
Aerospace Academy

NASA Lewis Research Center Cleveland, Ohio 44135

SCIENCE, ENGINEERING, MATHEMATICS AND AEROSPACE ACADEMY (SEMAA)

Name (please print)

Last

First

Middle

Address

(Number and Street Address, including apartment number)

City

State

Zip

Phone

Parent(s) Name(s)

School Name

School Address

Grade

Date of Birth

/ /

SS#

Please check the SEMAA Program(s) for which you would like to receive additional information:

☐ K-4th Grades

FAMILY MATH, FAMILY SCIENCE, FAMILY COMPUTING

☐ 5th-6th Grades

SCIENCE AND MATHEMATICS ENRICHMENT ACADEMY

☐ 7th-8th Grades

KEY TO EXCELLENCE FOR YOUNG SCHOLARS

☐ 9th-12th Grades

SEMAA AND CASE WESTERN RESERVE UNIVERSITY SATURDAY PROGRAM

☐ 9th-12th Grades

ACCESS TO CAREERS IN ENGINEERING (ACE)

(Cleveland State University)

Return form to:

SCIENCE, ENGINEERING MATHEMATICS AND AEROSPACE ACADEMY (SEMAA)
Center for Training and Economic Development/Division of Educational Opportunities
2415 Woodland Avenue
Cleveland, Ohio 44115
216/987-3092 FAX 216/987-3038

SEMAA is sponsored by NASA Lewis Research Center and Cuyahoga Community College
In Partnership With
Kent State University, Cleveland State University and Case Western Reserve University

**FAMILY MATH, FAMILY SCIENCE, FAMILY COMPUTING
KENT STATE UNIVERSITY**

- Targeted for kindergarten through fourth-grade students
- Assists parents to serve as facilitators for program
 - institutionalizes science/mathematics in home
 - young children learn to appreciate science/mathematics
 - utilize science/mathematics materials developed at Lawrence Hall of Science
- Four sessions each year.
- Eighty families participate each session.
- Each session meets 6 times
 - meet Saturdays for 2 hours or one evening after school for 1 hour.
- One hour/week every other week. Facility open to continue enrichment activities of children/parents who have completed session.
- Field trips included in programs.
- Summer Camp held in summer to augment efforts.

Matemáticas, ciencia y computación para la familia
Clases en su vecindad
En colaboración con
Kent State University

- Para estudiantes de kindergarten hasta el cuarto grado de escuela elemental
- Habilita a los padres para servir de "instructores" en el programa.
 - La ciencia y las matemáticas se vuelven parte de la vida familiar.
 - Les enseña a los niños a entusiasmarse por la ciencia y las matemáticas.
 - Se utilizan materiales de ciencia y matemáticas desarrollados en el Lawrence Hall of Science.
- 4 sesiones al año.
- 80 familias pueden participar en cada sesión.
- Cada sesión se compone de seis reuniones:
 - Las sesiones tienen lugar los sábados por 2 horas ó, una noche después de la escuela por 1 hora en un lugar conveniente en su vecindad.
 - El lugar estará disponible por una hora cada dos semanas con el fin de continuar las actividades de refuerzo para los niños y los padres que han terminado el programa.
- Este programa ofrece excursiones.
- Campamento de verano para reforzar los conocimientos adquiridos.

SCIENCE AND MATHEMATICS ENRICHMENT ACADEMY
CUYAHOGA COMMUNITY COLLEGE

- Targeted for fifth and sixth-grade students
- Purpose:
 - Through "hands on/minds on" activities, increase participants awareness of science, utilize math skills, and increase participants' skills in the use of laboratory equipment.
- Three sessions conducted each academic year--Fall, Winter, Spring.
- Each session meets for 8 weeks on Saturdays for 3-hours--at present, limited to 100 students/session.
- Parent program to build home support for child(ren)'s interest in science and mathematics.
- Summer Camp held in summer to augment efforts.

Science and Mathematics Enrichment Academy
(Academia de enriquecimiento en ciencia y matemáticas)
Cuyahoga Community College

- Para estudiantes en el quinto y sexto grados de escuela elemental.
- Objetivo:
 - Mediante actividades de "capacitación práctica y teórica" aumentar en el estudiante los conocimientos científicos, proveerle la oportunidad de utilizar destrezas de matemáticas y acrecentar el manejo del equipo de laboratorio.
- 3 sesiones cada año escolar - otoño, invierno y primavera.
- Cada sesión se reúne por 8 semanas - los sábados por 3 horas (Actualmente cada sesión está limitada a 100 estudiantes.)
- Programa en el hogar para crear entusiasmo en el niño por la ciencia y matemáticas.
- Campamento de verano para reforzar los conocimientos adquiridos.

KEY TO EXCELLENCE FOR YOUNG SCHOLARS (KEYS)
CUYAHOGA COMMUNITY COLLEGE

- Targeted for seventh and eighth-grade students
- Purpose: (provides)
 - "hands on/minds on" learning activities in math and science.
 - awareness of careers in the fields of science, mathematics, engineering and technology.
 - assessment of career interests and assists in selection of appropriate courses in high school.
 - interaction with scientists, mathematicians and engineers.
- Program elements
 - Five week math and science program in summer.
 - Weekly after school enrichment in science and mathematics during the academic year.
 - Monthly career awareness and career planning.
- Limited to 200 participants/year.
- Parent Boosters
 - Assist in program development to identify parental needs toward support of child('s) academic success.

Key to Excellence for Young Scholars (KEYS)
(Clave para la excelencia del estudiante joven)
Cuyahoga Community College

- Para estudiantes en el séptimo y octavo grados.
- Objetivo:
 - Actividades de "capacitación práctica y teórica" en matemáticas y ciencia.
 - Conocer las posibilidades para carreras profesionales en los campos de ciencia, matemáticas, ingeniería y tecnología.
 - Asesoría para el estudiante sobre sus intereses y sobre la selección de cursos relevantes a sus intereses en la escuela secundaria.
 - Oportunidad de consultar con científicos, matemáticos e ingenieros.
- Componentes del programa:
 - Programa de matemáticas y ciencia de 5 semanas durante el verano.
 - Actividades de refuerzo en matemáticas y ciencia semanales - durante el año escolar.
 - Actividades mensuales para desarrollar las posibilidades de carreras y planificación para una carrera.
- Limitado a 200 participantes al año.
- Participación de los padres:
 - Durante el desarrollo del programa, los padres identifican lo que necesitan para ayudar a sus hijos a superar en sus estudios.

**SEMMAA/MINORITY ENGINEERS INDUSTRIAL OPPORTUNITY PROGRAM
CASE WESTERN RESERVE UNIVERSITY**

- Target for ninth through twelfth-grade students.
- Purpose:
 - To improve, challenge and enrich students' skills in mathematics and science.
 - To prepare students for college entrance exams, e.g. SAT, ACT, etc.
 - To further increase students' knowledge about engineering and science.
 - To further increase parents' awareness of the need and opportunities available in engineering, technology and science careers.
- Academic Year meet October-April.
- Meet every Saturday for 3 hours.
- Summer Component meet daily one-half day in July.
- Ninth-tenth grade students meet at CCC
- Eleventh-twelfth grade students meet CWRU.
- Parents participate in program.

SEMAA/MINORITY ENGINEERS INDUSTRIAL OPPORTUNITY PROGRAM
(PROGRAMA DE OPORTUNIDADES INDUSTRIALES PARA INGENIEROS DE GRUPOS MINORITARIOS)

En colaboración con

Case Western Reserve University

- Para estudiantes del primer al cuarto año de secundaria.
- Objetivo:
 - Mejorar, relar y enriquecer las habilidades del estudiante en las disciplinas de matemáticas y ciencia.
 - Preparar a los estudiantes para los exámenes de admisión universitaria tales como SAT, ACT entre otros.
 - Ampliar el conocimiento del estudiante sobre la ingeniería y la ciencia.
 - Ampliar el conocimiento de los padres sobre el valor de y las oportunidades disponibles para carreras en los campos de la ingeniería, tecnología y ciencia.
- El año escolar será de octubre a abril.
- Los participantes se reúnen cada sábado por 3 horas.
- Programa de verano - diariamente, por medio día en julio.
- Los participantes en los grados 9 y 10 se reúnen en CCC.
- Los participantes en los grados 11 y 12 se reúnen en CWRU.
- Los padres participan en este programa.

**ACCESS TO CAREERS IN ENGINEERING (ACE)
CLEVELAND STATE UNIVERSITY**

- Target for ninth through twelfth-grade students.
- Purpose:
 - To introduce engineering careers.
 - To provide academic enrichment in science, engineering and mathematics.
- Meet October - May
 - Tuesday for 2 hours--engineering activities
 - Thursday for 2 hours--math tutoring
- Summer Component
 - 6 weeks, 20 hours/week
- Approximately 60 students/year (15/grade level)
- Parent Component
 - Quarterly parent meetings
 - Chaperon field trips
- Offer freshman scholarships for students to attend CSU with a major in Engineering.

ACCESS TO CAREERS IN ENGINEERING (ACE)

(Acceso a carreras en Ingeniería)

En colaboración con

Cleveland State University

- Para los estudiantes del primero al cuarto año de secundaria.
- Objetivo:
 - Presentar las carreras en el campo de Ingeniería.
 - Proveer refuerzo académico en ciencia, Ingeniería y matemáticas.
- De octubre a mayo:
 - Actividades en Ingeniería - los martes por 2 horas.
 - Tutoría en matemáticas - los jueves por 2 horas.
- Programa de verano:
 - 6 semanas, 20 horas a la semana.
- Se admiten aproximadamente 60 estudiantes cada año (15 de cada grado).
- Para padres:
 - Reuniones de padres cada 3 meses.
 - Los padres asisten en excursiones estudiantiles.
- Oportunidad para becas durante el primer año de estudios para los estudiantes que quieren asistir a CSU y especializarse en Ingeniería.

SEMAA PICNIC -- COME JOIN THE FUN

STUDENTS AND THEIR IMMEDIATE

FAMILIES ARE INVITED:

DATE: SATURDAY, JULY 27, 1996

PLACE: NASA LEWIS RESEARCH CENTER

PICNIC GROUNDS

21000 BROOKPARK ROAD

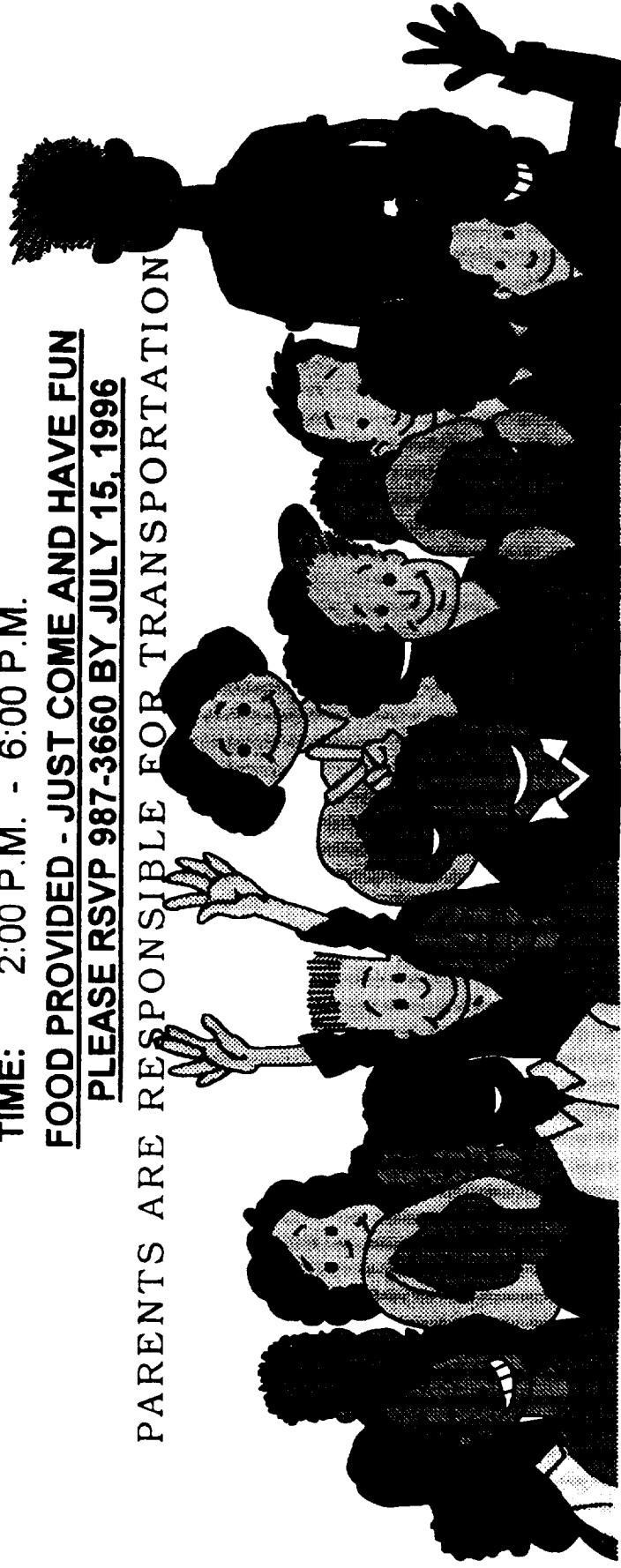
CLEVELAND, OHIO 44135

TIME: 2:00 P.M. - 6:00 P.M.

FOOD PROVIDED - JUST COME AND HAVE FUN

PLEASE RSVP 987-3660 BY JULY 15, 1996

PARENTS ARE RESPONSIBLE FOR TRANSPORTATION





**ALL SEMAA STUDENTS
&
THEIR IMMEDIATE FAMILIES ARE
INVITED TO A PICNIC!**

**on
SATURDAY, JULY 27, 1996
2PM TO 6PM**

**AT THE
NASA LEWIS RESEARCH CENTER
PICNIC GROUNDS**

**located at:
21000 BROOKPARK ROAD
(SEE MAP ON BACK)**



FOOD WILL BE PROVIDED!!



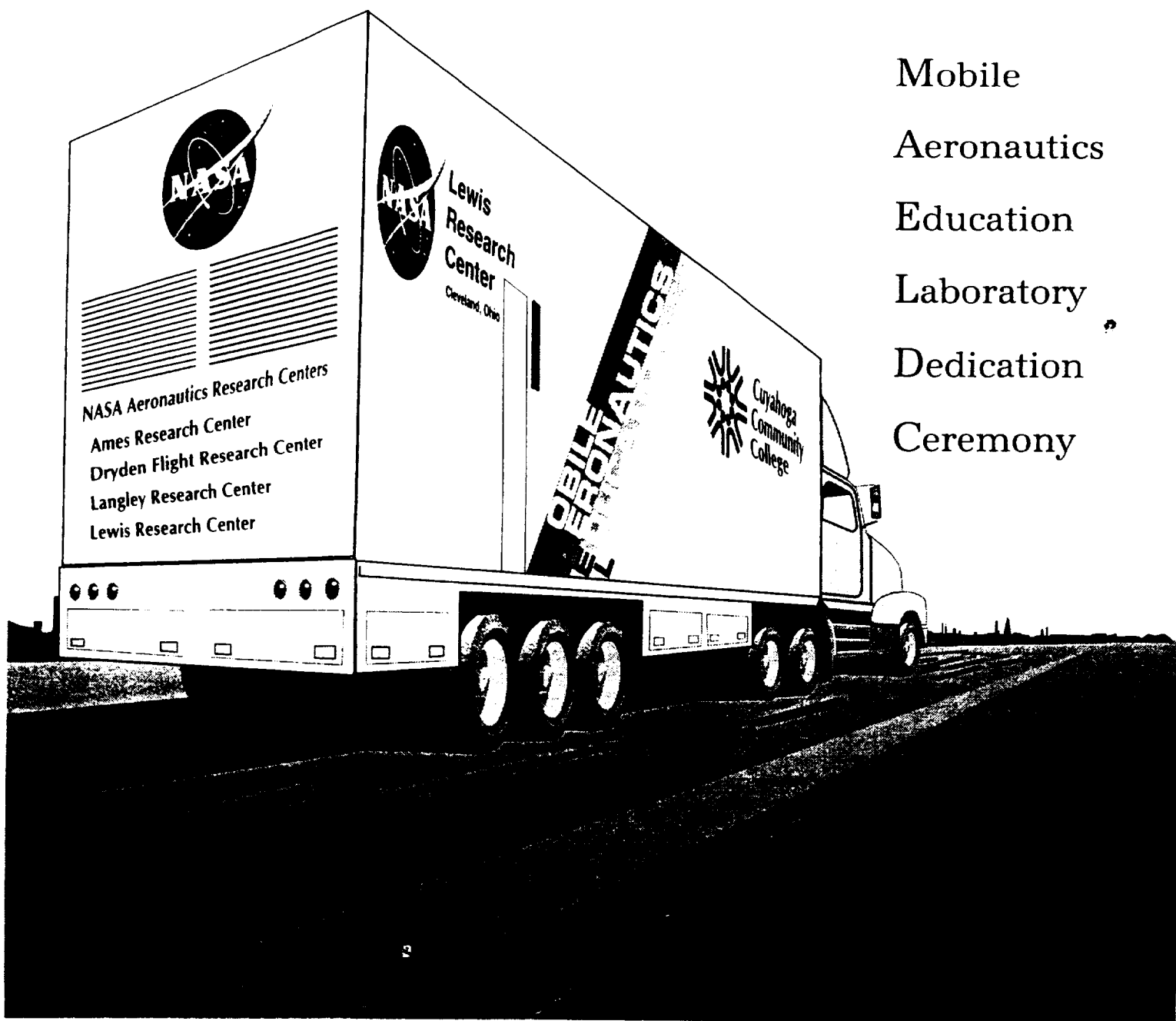
**PARENTS ARE RESPONSIBLE
FOR TRANSPORTATION**

**COME JOIN US FOR FUN
RAIN OR SHINE**

May 24, 1996

NASA Lewis Research Center

Cleveland, Ohio



Mobile
Aeronautics
Education
Laboratory
Dedication
Ceremony

Background

With funding provided by NASA Headquarter's Office of Equal Opportunity Programs, NASA Lewis Research Center has worked with Cuyahoga Community College to establish the Science, Engineering, Mathematics and Aerospace Academy (SEMAA). SEMAA is a K-12 program that is intended to excite students, especially underserved students, about science and mathematics. SEMAA's curriculum focuses on living and working in space for K-5 grade students; exploration of the solar system, for 6-8 grade students, and aeronautics for 9-12 grade students. The Mobile Aeronautics Education Laboratory will be utilized to support SEMAA's aeronautics activities.

The Mobile Aeronautics Education Laboratory (MAEL) is a state-of-the-art classroom that brings new technologies to partnership cities to excite students about science and math using NASA aeronautics as a theme. "Hands on/minds on" activities involve students in completing a cross country flight utilizing the 10 MAEL workstations.

Workstations include

- Virtual Reality
- Weather
- Aircraft Design
- GPS/ Amateur Radio
- Remote Sensing
- Wind Tunnel
- Internet/World Wide Web
- Resource Center
- Activity Center
- Aeronautics Interactive Station

The MAEL was constructed by High Tech Performance Trailer, Inc., in Painesville, Ohio. The 16.2-meter (53-foot) trailer offers a sleek, futuristic workarea for visitors. The trailer is handicapped accessible, with adaptations added to equipment where possible. A 3.7- by x 3.7 meter (12- by 12-foot) platform can also extend from the trailer for outdoor activities. Geometric patterns on the roof are designed for remote sensing activities. The trailer has stand alone power capabilities and is road-transported by tractor trailer.

In addition to the MAEL's involvement with SEMAA, the MAEL will be used to

- Motivate student exploration of careers in technology, engineering and science
- Provide educational programs for the underserved, engaging students in the problem-solving skills of math and science
- Operate as a demonstration site for the use of technology in teaching math and science
- Showcase NASA's aeronautical programs at conferences, special programs and airshows
- Serve as a catalyst for systemic reform in education by networking with partnership cities

The Mobile Aeronautics Education Laboratory (MAEL)

Description:

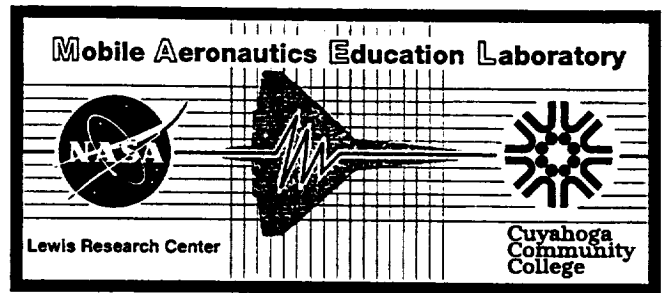
The Mobile Aeronautics Education Laboratory (MAEL) is a mobile, state-of-the-art classroom that brings new technologies to partnership cities to excite students about science and math. In 10 unique workstations, visitors can explore these technologies through "hands on/minds on" activities that model real-world challenges in aviation. An aeronautics theme ties the stations together as participants gather essential data necessary for the completion of a cross country flight. The MAEL's trailer and program were created through a partnership between Cuyahoga Community College (CCC) and NASA Lewis Research Center in Cleveland, Ohio. The MAEL will also be used as part of the Science, Engineering, Math, and Aerospace Academy (SEMAA), a K-12 education program developed by Lewis and CCC.

Trailer:

The 16.2 meter (53 ft.) trailer offers a sleek, futuristic work area for visitors. The trailer has stand-alone power capabilities and is accessible to persons with disabilities. A platform extends from the trailer for outdoor activities. Geometric patterns on the roof are designed for use in remote sensing activities. The trailer is road-transported via tractor trailer and was constructed by High Tech Performance Trailer, Inc.

MAEL Workstations:

- Virtual Reality
- Weather
- GPS/Amateur Radio
- Remote Sensing
- Internet/World Wide Web
- Aircraft Design
- Aeronautics Interactive
- Activity Center
- Wind Tunnel
- Resource Center



Educational Objectives:

- To serve as an activity site for students participating in Cuyahoga Community College's SEMAA program.
- To motivate student exploration of careers in technology, engineering and science.
- To provide educational programs for the underserved, engaging students in the problem-solving skills of math and science.
- To operate as a demonstration site for the use of technology in the teaching of math and science, using NASA aeronautics as a theme.
- To showcase NASA's aeronautical programs through visits to educational settings, conferences, exhibits and airshows.
- To serve as a catalyst for systemic reform in education by networking with partnership cities.
- To serve as a test site for the development of NASA aeronautical education materials to be used nationwide.
- To train aeronautics education leadership to enhance NASA aeronautics presence throughout the United States.

MAEL Curriculum:

The MAEL Curriculum has been developed by a team of NASA engineers and staff, educators from Cuyahoga Community College, Cleveland-area teachers, Cleveland State University (CSU) faculty and the evaluation team from the Center for Applied Research in Education (CARE) at CSU. Activities are related to a cross country flight theme and are being teacher and student-tested for ease of use. The activities correspond to math and science standards to enhance the educational relevance of the materials nationwide.

Participants are prepared for their mobile visit through a MAEL previsit curriculum package which includes videos, a planning guide, curriculum handbook and special activities. On-site activities offer a variety of learning experiences to provide maximum accessibility for students with diverse interests and abilities. Postvisit and evaluation activities complete the experience for students and teachers.

Workstation Activities:

Virtual Reality: Permits participants to experience a Virtual Reality flight in a flight simulation cockpit and in an immersive environment, using a head-mounted display unit.

GPS/Amateur Radio: Includes a Global Positioning System and Amateur Radio station to gather information related to aviation and geography.

Internet/ World Wide Web: Enables use of the Internet to search for information needed to complete a cross country flight.

Aeronautics Interactive Workstation: Provides a multimedia database that highlights aviation history, NASA aeronautics, and career information.

Wind Tunnel: Permits participants to test various aeroshapes and observe air flow forces on aeronautic models.

Weather: Involves participants in gathering weather information necessary for a cross country flight.

Remote Sensing: Involves participants in photo interpretation of selected images taken by aircraft and satellites.

Resource Center: Provides reference materials for students and teachers. Can view aero images on CDs and receive a slide or photograph from the film recorder at end of the mobile visit.

Aircraft Design: Provides participants with an experience in aircraft design and charting a flight path.

Activity Center: Provides a location in the MAEL to work with manipulatives that relate to aeronautics.

NASA Aeronautics Research Centers

Ames Research Center
Moffett Field, CA 94035

Hugh L. Dryden Flight Research Facility
P.O. Box 273
Edwards, CA 93523

Langley Research Center
Hampton, VA 23681

Lewis Research Center
21000 Brookpark Rd.
Cleveland, OH 44135

Looking for Partnership Cities:

Contact: Dr. R. Lynn Bondurant
MAEL Project Director
Lewis Research Center
21000 Brookpark Rd., MS 3-16
Cleveland, OH 44135
216-433-5583

Dedication Program

Welcome Don Campbell, Master of Ceremonies
Director, NASA Lewis Research Center

Video Mobile Aeronautics Education Laboratory

Greetings and Comments

Hon. Martin R. Hoke
Congressman, 10th District

Hon. Steven LaTourette
Congressman, 19th District

Hon. Sherrod Brown
Congressman, 13th District

Hon. Thomas C. Sawyer
Congressman, 14th District

Hon. Louis Stokes, by video
Congressman, 11th District

Caroline Arnold
Representing Senator John H. Glenn

Bob Paduchik
Representing Senator Mike DeWine

Tom Marsalis, Representing Mayor Michael R. White
Deputy Commissioner, Division of Water Pollution Control
City of Cleveland

Dr. Robert E. Whitehead
Associate Administrator for Aeronautics
NASA Headquarters

Dr. Jerry Sue Thornton
President
Cuyahoga Community College

George E. Reese
Acting Associate Administrator for Equal Opportunity Programs
NASA Headquarters

Dr. Malcom Phelps
Assistant Director for Programs
Education Division, NASA Headquarter

(Continued)

Dr. Richard A. Boyd
Superintendent
Cleveland Public Schools

Young-Charles Alexander, SEMAA participant
5th Grade, Chambers Elementary School

John Hairston
Director of External Programs
NASA Lewis Research Center

Jessica Cleary, SEMAA participant
9th Grade, Regina High School

R. Lynn Bondurant, Jr.
MAEL Project Director
NASA Lewis Research Center

Following the formal dedication ceremony, there will be refreshments in the Visitor Center Auditorium. Everyone is also invited to tour the Mobile following the ribbon cutting ceremony.

Mael Project Team Leads

Project Director	R. Lynn Bondurant, Jr.
Project Manager	Scott Benson
MAEL Design and Construction	Tom Hinshaw

MAEL Workstations

Activity Center	Sheila Bailey
Aircraft Design	Ames Research Center/Scott Benson
Aeronautics Interactive Station	Susan Kevdzija
Facility Management	Tom Hinshaw
GPS/Amateur Radio	Bruce Bream
Internet/World Wide Web	Carol Galica
Remote Sensing	Jay Owens
Resource Center	Daniel Fay and Marge Lehky
Television	James Ely
Virtual Reality	Tim Dedulla
Weather	Scott Benson
Wind Tunnel	Martin Mayer

Curriculum Team

Ron Abate
Scott Benson
Cindy Hill, Editor/layout
Norm Poff
Rose Wolf
Work Station Leads

Graphic Design

Les Bossinas

Videography

William Fletcher

Evaluation

Rose Wolf

Network Installation

Gynelle Mackson

SEMAA Staff

Tom McManamon, Director
Catherine Reed
Gail Smith
Patricia DeBerry
Valerie Noel

Photography

Marvin Smith
Quentin Schwinn

MAEL

June 28, 2010



TAKING A PICTURE BREAK

MAEL



These first MAEL students had an exciting experience on the the Mobile Aeronautics Educational Laboratory. In this program, we designed airplanes, experienced Virtual Reality and worked at a weather station. We also were able to participate in

the GPS Amateur radio and the world wide web.

This event will hopefully encourage these students to look into careers related to math and science. The MAEL will educate and interest the future generation in math, science, engineering and computers.

Kodi Smith and John Price

GATHERING WEATHER INFORMATION

Students also went outside to read the compass and get information about the weather. We were trying to find the direction of the wind because, it was part of our mission. We also found out the temperature and speed of the wind. After finding the information outside, we recorded it on the computer, inside. We compared our results.



Cuyahoga
Community
College

DAVID Thomas and Micheal Webster



The Wonderful War of Aeronautics Interac- tive

This is a program teaches people about the many subjects that involve aeronautics. It also includes history of different NAS, stations and their recent developments.

Students used a computer keyboard, mouse and head to complete the goals of

the task cards.

The program involves the earliest attempts to invent different means of travel. It also provides a multimedia database that highlights aviation & aeronautics and career information.

Sylvester-Lee Ajamu and
Alex Adorno

GPS

Amateur Radio

GPS Amateur Radio is about collecting airport information using airport location computer software. We found out the name, designer, latitude, longitude and elevation of six different airports near the NASA research center.

Christopher Mitchell
and
Mara Mendes



Virtual

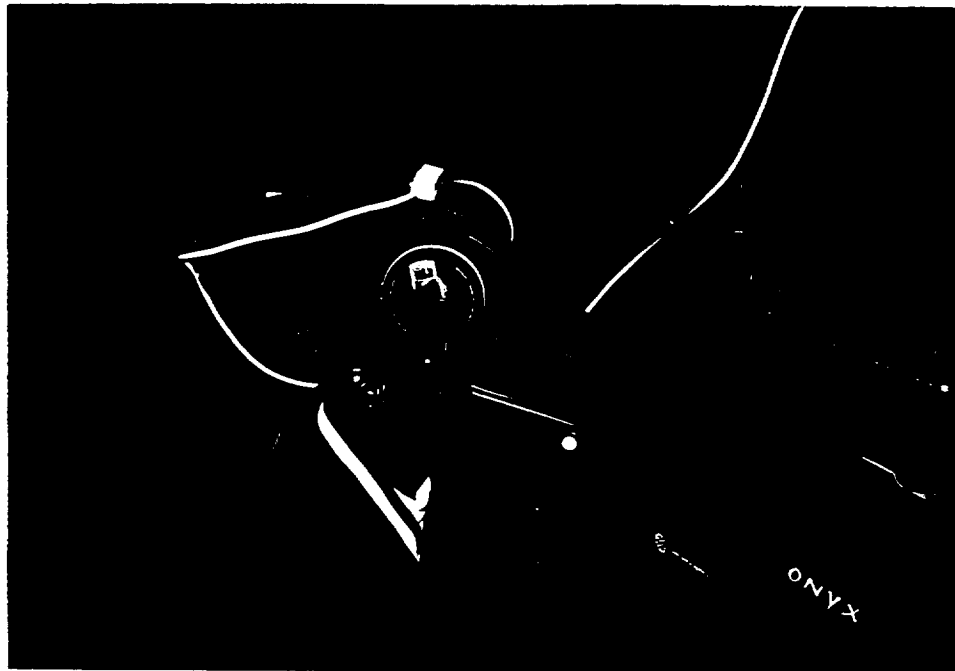
Lifelike

Flight



The world of virtual flight for us began in the heart of the M.A.E.L. It was quite a new experience very fun yet mysterious in its own way. Tim Dedola anchor and designer of the VR unit was very helpful in assisting us in using the system.

Raymond Adams
Geoffrey Taylor



Virtual Reality

With the help of a helmet I flew a plane. In the helmet, there were two screens. On the floor was a box with a joystick. Only you use it to control the plane. I would like to say that I really enjoyed the virtual reality station.

John Long



SEMAA
Participating
Staff

CHRISTOPHER MITCHELL
MARIO MENDES
KODI SMITH
MICHAEL WEBSTER
GEOFFREY TAYLOR
SYLVESTER LEE AJAYI

DAVID THOMAS
JOHN PRICE
JOHN LONG
ALEJANDRO ADORNO
RAYMONE ADAMS

JOAN BOROVIKA
SCOTT BENSON
CATHERINE REED

SEMAA MAEL TEACHER
NASA, LEWIS RESEARCH CENTER MAEL COORDINATOR
CUYAHOGA COMMUNITY COLLEGE SEMAA COORDINATOR

the
MAEL
June 12, 1996 carrier



Cleveland, OH- We, the SEMAA participants are taken a break from working in the MAEL unit (mobile Aeronautic Education Laboratory). There we experimented with six stations: Weather, Virtual Reality, world wide web, GPS / Amateur Radio, Aeronautics Interactive, and aircraft Design. During this past week we have experienced many different activities with aeronautics. We had an interesting time d schooling.

SEMAA Participants

Marshall Buckley
Samuel Matthews
Mike Bailey
Nathan Romansky
Oyebisi Olatoya

Mark Cambell
Soni Warren
Dionna Bailey
Samuel Davidson
Danielle Pride

Aircraft Design



In aircraft design we took a plane that did not fly properly and made changes. The wings, tail, engine, seating, and cruise could be changed. The three major



categories we changed were wings, tail, and engine. The unit also had us find out different information of other airports near NASA centers. We also had a course between these airports,

we used in which we could see how long it would take to fly with different planes.

Nathan Romanek, Marshall Buckley

Flight Simulation

The flight simulator is in the very back of the MAEL trailer behind a curtain that makes the whole room dark. There are three full-size monitors in order to provide a wide view of the region where you are flying.

A fourth monitor on top gives an over head map display. The chair you sit in was extracted from the cockpit of an actual air plane.

by Sam Davidson



Virtual Reality

The virtual reality was the same program as the simulation. The only difference was you could look at the tail of your plane because you had a VR headset. The headset made you almost feel as if you were really

in the cockpit of the plane. When the headset was on, you could see that you were in an old bi-plane. With the headset the flight was easier too.

by Sam Matthews



AERONAUTICS Interactive

The Aeronautics Station gives students the chance to experience four NASA Research Centers without actually going to visit them. The four NASA centers on the software



program were Langley, Ames, Dryden and Lewis Research Centers. These stations offer a chance to discover the major contributions that each center has made in AERONAUTICS.



Mark Campbell
Sami Warrall

REGISTRATION INFORMATION

Registration Deadline: May 30, 1996

Register as soon as possible, only a limited number of students will be accepted into each program. **Students are accepted on a first come, first serve basis ONLY!**

To Register: Complete the registration form and mail it to:

SEMMA
Cuyahoga Community College
2900 Community College Avenue - B & A 230
Cleveland, Ohio 44115

To Register by FAX:

FAX your registration form to: 987-3662

**For additional program information,
please call (216) 987-3660**

**Se habla Espanol
por favor de Llamar
a 987-3660 o 987-4420**

SEMMA Summer Youth Program Registration Form

One registration form per child

Grade student will be going into this fall _____

School Name: _____

Check Program Registering For: 4-8 _____ Session: I _____ II _____ III _____ IV _____
Students completing the 3rd grade may
sign-up for the summer.

9-12 MAEL/CCC _____ Session: I _____ II _____

9-12 ACE/CSU _____

Name: _____
Last First Middle

City: _____ State: _____ Zip: _____

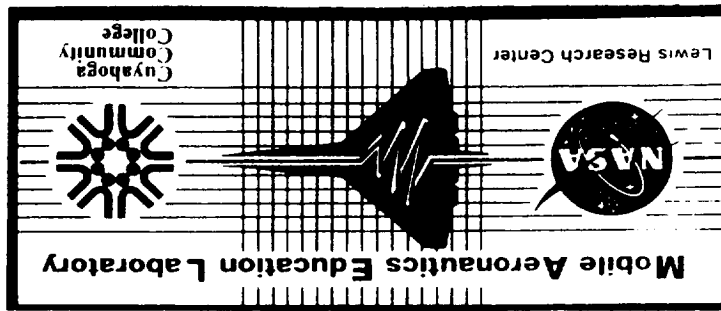
Telephone Number: _____ - _____ - _____ Male/Female _____

Parent(s)/Guardian(s) Name(s): _____

Daytime Phone: _____ - _____ - _____ Best Time to Call: _____

Signature of Parent/Guardian

Date



In cooperation with Case Western Reserve University & Cleveland State University

Summer Youth Program

Louis Stokes 1996

Science, Engineering, Mathematics and Aerospace Academy (SEMMA)



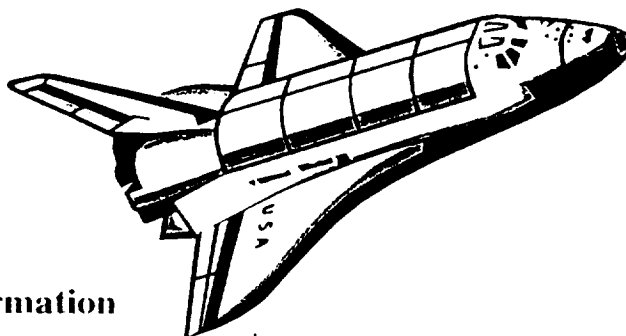
SEMMA
Cuyahoga Community College
2900 Community College Avenue - B&A 230
Cleveland, Ohio 44115-3196

First Class
U.S. POSTAGE
PAID
Cleveland, OH
Permit No. 3675

Louis Stokes 1996 Summer Youth Program
Science, Engineering and Mathematics

Science, Engineering, Mathematics and Aerospace Academy (SEMAA)

Louis Stokes 1996 Summer Youth Program



Program Information

Exploring the Universe Through Math & Science (4th thru 8th Grade)

This summer enrichment program combines fun-filled activities in science, engineering and mathematics with knowledge about career opportunities. Students will be provided "hands-on/minds-on" activities in order to increase their awareness of science and math.

Dates/Times/Location:

Students will meet by grade level everyday for a week from 9am to noon at various Cuyahoga Community College campuses (see schedule).

Students may attend only one of the four sessions.

CUYAHOGA COMMUNITY COLLEGE SESSIONS:

I	JUNE 24 - 28	METRO CAMPUS
II	JULY 08 - 12	EASTERN CAMPUS
III	JULY 15 - 19	EASTERN CAMPUS
IV	JULY 22 - 26	WESTERN CAMPUS

Discovering Aeronautics Through the Mobile Aeronautics Education Lab (MAEL) (9th thru 12th Grades) - CCC

Students will do various projects utilizing the new NASA MAEL. The MAEL is a mobile, state-of-the-art classroom trailer that pioneers the use of cutting-edge technologies in the teaching of math and science. "Hands-on/minds-on" activities model real-world aeronautical challenges that students explore within 10 unique work stations, including a virtual reality flight simulation.

Dates/Times/Location:

Students will meet everyday from 9am to noon. Students may choose one of the two sessions to attend. Due to the limited space on the mobile unit a maximum of 12 students per session will be allowed. Students will be transported to the mobile unit at NASA Lewis Research Center

I	June 24-28	Metro Campus
II	July 8-12	Metro Campus

Access to Careers in Engineering (ACE) (9th thru 12 Grades) - CSU

The program at Cleveland State University is designed to introduce students to engineering careers and provide academic enhancements in science, mathematics and engineering through both classroom work and "hands-on" experiments. The Program will also utilize the MAEL. The ACE program requires students to have an A/B grade point in math and science for enrollment.

Dates/Times/Location:

June 17, 1996 through July 26, 1996,
Monday through Friday, 8:30am to 12:30pm at
Cleveland State University.

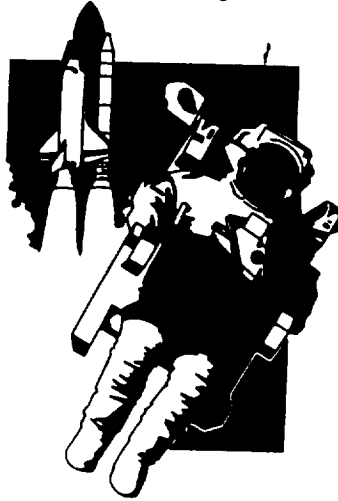
SEMAA Family Picnic:

To be announced.

All 1996 SEMAA students and their families are invited to the SEMAA Family Picnic.

Food and games are included. Students who were in any SEMAA program including the Math and Science Club, winter, spring or summer programs are invited.

Science, Engineering, Mathematics and Aerospace Academy (SEMAA)



Louis Stokes 1996 Summer Youth Program

The summer program is for 3rd through 12th grade students and will provide "hands on" science and mathematics activities, career awareness sessions and exposure to scientists, mathematicians and engineers.

SEMAA's Goals are to:

- **Increase the participation of underrepresented/underserved groups in science, Mathematics, Engineering and Technology Careers.**
- **Increase "success" rates of all students interested in Science and Mathematics.**
- **Develop partnerships to recognize and support students interested in these fields.**
- **Support continued success of highly successful students.**

**There is no cost to participants
for the SEMAA Summer Programs**

APPENDIX B

SEMAA PROJECT TEAM

SEMAA PROJECT TEAM

Mr. Cullen Johnson	Executive Director, Center for Training and Economic Development/Continuing and Professional Education
Mr. Thomas McManamon	Project Manager, Science, Engineering, Mathematics and Aerospace Academy (SEMAA)
Ms. Valerie Noel-Joshua	Program Assistant, Science, Engineering, Mathematics and Aerospace Academy (SEMAA)
Ms. Patricia DeBerry	Coordinator, K-4 (Living in Space) Cuyahoga Community College
Ms. Catherine Reed	Coordinator, 5-12 (Exploring the Solar System and Discovering Aeronautics) Cuyahoga Community College
Ms. Margaret Boulding	Assistant Dean, Minority Programs, Case Western Reserve University
Ms. Pamela Charity	Director, Access to Careers in Engineering, Cleveland State University
Ms. Gail Dolman-Smith	Coordinator, Parents Program
Mr. Luis Gomez	Hispanic Outreach Liaison
Dr. Lynn Bondurant	NASA Representative

APPENDIX C

ADVISORY BOARD MEMBERSHIP

SEMAA ADVISORY BOARD MEMBERSHIP

Mr. Nelson Bardecio	Executive Director, El Barrio Center
Ms. Chris Abby-Broom	Student Advisor, ACCESS, Cuyahoga Community College
Ms. Connis Brown	Parent Liaison
Mr. Leon Cleverly	Director, Corporate Relations, Case Western Reserve University
Mr. Thomas Cochran	Director, Space Flight Systems, NASA Lewis Research Center
Ms. Bonnie Cummings	Head of Education, Natural History Museum
Dr. Isaac Greber	Professor, Mechanical Engineering, Case Western Reserve University
Ms. Barbara Hardiman	Associate Professor, Mathematics, Cuyahoga Community College
Ms. Rebecca Kapley	Assistant Professor, Biology, Cuyahoga Community College
Dr. Henry Lewandowski	Assistant Professor, Industrial Engineering, Cleveland State University
Dr. Averil McClelland	Director, Project for Gender and Education, Kent State University
Dr. James Paces	Executive Director of Curriculum, Shaker Heights City Schools
Ms. Natividad Pagan	Supervisor, Bilingual Office, Cleveland Public Schools
Mr. Norm Pilch	Northeast Region Director, Project Discovery
Mr. Cary Seidman	Science Specialist, East Cleveland City Schools
Ms. LaWanna White	Science Supervisor, Cleveland Public Schools
Ms. Joyce Williams	Director of Education, Great Lakes Science Center

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